is on the side of under-estimating. The amount must be somewhat increased for students of medicine and engineering, and for a non-collegiate student somewhat lowered, say to 80*l.*–90*l.* per annum.

Finally, although, perhaps, not carrying the weight of a document which has been considered by a representative committee, a circular issued by the Bursar of Trinity is regarded by many of the members of the Senate as one of the most important and valuable contributions to reform in the University. The matter with which it deals is difficult to explain shortly, but roughly it amounts to this:—A graduate, in taking his degree, pays high fees for the degree of B.A. and M.A.: after graduating, if he wishes to continue a member of the University and the college in which he was educated, he has to pay an annual sum to keep his name on the boards of the University or the college. It has always been a little difficult to explain to the young B.A. to what purposes this latter sum is devoted, and what, beyond a vote for the University Members of Parliament, advantages accrue to the graduate who remains a member of the University. There is thus a slight sense of irritation amongst those who keep their names on the boards, and in the case of those who do not compound this irritation recurs annually. On the other hand, those (and they are a large majority) who do not remain officially connected with Cambridge have the feeling that they have been "shown the door," and that no longer are they officially and technically members of the institution in which many of them spent the happiest years of their lives.

Mr. Innes's proposal is to reduce the degree fees to a nominal amount, and to abolish the fees for keeping names on the boards. If this were done, there would undoubtedly be a large increase in the numbers of graduates proceeding to the M.A. degree, and every graduate would remain a member of his college and of the University. To compensate for the loss of the fees which would thus be lowered or abolished, it is proposed that an additional charge should be imposed upon the student whilst in residence. If this could be effected, the whole body of graduates would become, and would remain, members of the Senate, and would, one cannot help believing, be more loyal and enthusiastic members of the University than is the case with those who have technically ceased to belong to their *Alma Mater.*

THE ROYAL SOCIETY'S CONVERSAZIONE.

A LARGE company assembled in the rooms of the Royal Society at Burlington House on Wednesday, May 12, on the occasion of the first of the two conversaziones given annually by the society. The visitors were received by the president, Sir Archibald Geikie, K.C.B., and great interest was shown in the exhibits of apparatus and results of recent scientific investigations. During the evening short demonstrations were given by Dr. A. E. H. Tutton, F.R.S., and Dr. Hans Gadow, F.R.S. Dr. Tutton's subject was crystals and colour: the revelation of crystal structure by polarised light. He gave a demonstration of the use of a new form of lantern polariscope to illustrate recent progress in knowledge of the internal structure of crystals. Magnificent colours were projected upon the lantern screen, though no coloured materials whatever were used to produce them, all the crystals employed being colourless. A new method of performing the Mitscherlich experiment with gypsum, without any extraneous heating of the crystal, was also shown. Dr. Gadow gave an account of the fauna, flora, and native races of Mexico.

The subjoined notes on the exhibits have been summarised from the official catalogue, and are here classified according to related subjects:—

Dr. G. E. Hale, For.Mem.R.S.: Photographs illustrative of work at the Mount Wilson Solar Observatory. (1) Three photographs of the sun, taken at the Mount Wilson Solar Observatory, April 30, 1908, showing (*a*) the photosphere, with sun-spots and faculæ; (*b*) the flocculi of calcium vapour; (*c*) the flocculi of hydrogen, at a higher level in the solar atmosphere. The hydrogen photographs, which are made with the spectroheliograph, reveal the existence of cyclonic storms or vortices associated with sun-spots. (2) Photograph of the sun, taken on Mount Wilson, October 7, 1908, with the red line of hydrogen. The vortices surrounding two large spots in the northern and southern hemispheres appear to rotate in opposite directions. (3) Six photographs, showing the mounting of the 60-inch reflector of the Mount Wilson Solar Observatory and the mode of transporting the tube to the summit on a motor-truck. (4) Blue print, showing design for tower telescope, of 150 feet focal length, now under construction for use on Mount Wilson. An image of the sun, 16 inches in diameter, will be formed in a laboratory at the base of the tower. The spectrograph for studying this image will have a focal length of 75 feet, and will be mounted in a well beneath the laboratory.—*Solar Physics Observatory, South Kensington:* (1) Photographs and diagrams illustrating researches in solar physics and its relations with terrestrial meteorology. (2) Astrophysics. (i.) Spectrum of ε Ursæ Majoris; (ii.) spectra demonstrating temperature differences, or similarities, of typical stars; (iii.) laboratory spectra—(*a*) oxygen (vacuum tube); (*b*) erbium (arc); and (*c*) tungsten (spark); (iv.) spectra showing identification of hitherto unknown lines in the spectrum of ε Orionis.—*Mr. A. Fowler:* Spectroscopic comparison of the star Mira Ceti with titanium oxide; to illustrate the origin of the characteristic bands of the Antarian or third-type stars.—*Mr. C. P. Butler:* Thorp-Butler concave replica-grating spectroscope. Some years ago several applications of the Thorp plane replica diffraction gratings were exhibited, notably their use with an opera-glass for eclipse work. Recent experiments have shown that concave replica gratings can be made to give very satisfactory results, and by slight modifications of the design of mounting, this form of spectroscope may be employed for any investigation for which the ordinary spectroscope is fitted.—*The Astronomer Royal:* (1) Photographs and diagrams of the observations of the distant satellites of Jupiter and Saturn. (2) Photographs of comet *c*, 1908 (Morehouse), taken with the 30-inch reflector at the Royal Observatory, Greenwich. (3) Tabular diagram showing the number and distribution of stars in the Greenwich section of the Astrographic Chart and Catalogue. The Greenwich section covers 2088 square degrees from the Pole to 26° N.P.D. Two series, each of 1149 photographic plates, were taken, one for the chart, with an exposure of forty minutes, and the other for the catalogue, with exposure of six minutes and twenty seconds, and the number of stars shown with each exposure has been counted. The total numbers are:—(*a*) with forty minutes, 719,000; (*b*) with six minutes, 178,600; (*c*) with twenty seconds, 38,373. The diagram shows the distribution of these stars in different parts of the area photographed, and the resulting star density.

Dr. W. J. S. Lockyer: Cloud photographs taken from balloon.—*Dr. Chree, F.R.S.:* Antarctic magnetic records and results.—*Prof. J. Milne, F.R.S.:* Seismograms of the Messina earthquake of December 28, 1908. These records were obtained at Shide, in the Isle of Wight, from two Milne horizontal pendulums. One of these recorded north-south motion and the other east-west motion.—*Prof. E. Hull, F.R.S.:* Admiralty charts along the coast of Europe and the British Isles, showing the continuation of the river-valleys under the ocean to depths of about 1000 fathoms (6000 feet).

Prof. J. Norman Collie, F.R.S.: A curious property of neon. Perfectly pure neon, when enclosed in a glass tube with mercury and shaken, glows with a bright orange-red colour. As neon does this at ordinary pressures, it appears to be different from other gases.—*Sir William Ramsay, K.C.B., F.R.S.:* Liquid radium emanation.

Radium emanation, produced in a week from about half a gram of radium bromide, is frozen with liquid air, freed from hydrogen by pumping, and introduced into a fine capillary tube. This is connected with an apparatus for compressing the gas; at ordinary temperature the gas liquefies to a colourless liquid of high density, which phosphoresces strongly—more strongly than the gas. At about 70° the liquid freezes to a solid, which, when further cooled, phosphoresces with remarkable brilliancy. *The Rev. H. V. Gill, S.J.:* A new kind of glow in vacuum tubes (see p. 358).—*The National Physical Laboratory*. (1) Electrically heated laboratory muffle furnace (*Mr. W. Rosenhain*). The special feature of the furnace is the high degree of heat insulation aimed at, together with ready access to the working parts. The muffle attains a temperature of 920° C. with a current consumption of 9 amperes at 105 volts, and the platinum winding shows no signs of deterioration after months of continuous use. (2) Quadrant electrometer for alternating current power measurements of high precision (*Mr. C. C. Paterson and Mr. E. H. Rayner*). (3) Standard non-inductive water-cooled manganin tube resistances of 0·001, 0·002, and 0·04 ohms respectively, to operate with currents of 2500, 1000, and 100 amperes respectively (*Mr. C. C. Paterson and Mr. E. H. Rayner*). (4) Metallic filament electric glow-lamp for photometric substandard (*Mr. C. C. Paterson and Mr. E. H. Rayner*). (5) Apparatus for testing definition and for determining the variation of light intensity in an image due to diffraction (*Mr. J. de Graaff Hunter*).

Prof. W. F. Barrett, F.R.S.: (1) Apparatus (*a*) for determining the light-threshold of the eye, and (*b*) for measuring the amount of light irregularly reflected from rough surfaces. (2) New form of optometer for the examination and measurement of defects in vision. Optometers have hitherto been defective owing to the impossibility of preventing involuntary accommodation of the observer's eye. In the present instrument this difficulty is overcome by the use of an inclined semi-transparent mirror in the eyepiece. By changing the attachment both pupillometric and entoptic examination of the eye can readily be carried out.—*Prof. Silvanus P. Thompson, F.R.S.:* (1) Experiments on the contraction, by heat, of india-rubber. India-rubber, under tensile stress, contracts strongly when its temperature is raised. Work is done by its contraction at the expense of the energy of the heat. Hence, it would be possible to construct a thermal engine in which the working substance is india-rubber, instead of steam or hot air, and operating by contraction, instead of expansion, of the working substance. (2) Standard magnets for quantometric work.

Mr. T. H. Laby and Mr. Horace Darwin, F.R.S.: A string electrometer, used to measure minute quantities of electricity, and as an oscillograph.—*Mr. T. H. Laby:* The counting of α particles (electrically charged helium atoms) by Prof. E. Rutherford's method. By an electrical method a deflection of an electrometer is obtained as each α particle passes into a cylinder. A wire is supported in the axis of this narrow metal cylinder, from which it is electrically separated by a guard-ring insulator. This ionisation chamber is enclosed in a sealed glass tube, and the air exhausted to a small pressure (4 mm.). A tap admits α particles from uranium, which pass into the cylinder and ionise the air in it. To detect these ions, Prof. Rutherford multiplied them by producing others from them by collision. The field between the cylinder (−) and the wire (connected to the electrometer) is adjusted of such intensity that the first-formed negative ions travelling to the wire produce others by collision with the air molecules. Thus, when an α particle travels through the cylinder lengthwise, many negative ions reach the wire, and so the electrometer, the string of which is suddenly deflected, but returns, as it is connected to earth through a high resistance of thin rubber.—*Mr. A. W. Porter:* Electric splashes on photographic plates. A photographic plate is backed by a plate-electrode, and a single spark discharge is allowed to pass over the plate from a second electrode in front; the plate is then developed. The new effects exhibited are brought about (1) by diminishing the pressure of the surrounding atmosphere; (2) by replacing it with other gases; (3) by placing the plate in a magnetic field.—*Dr. C. V. Drysdale:* (1) Vacuum tube model, showing the propagation of alternate currents in a helix (see *Phil. Mag.*, November, 1908); (2) stroboscopic apparatus for measuring speed, frequency, slip, and other periodic phenomena.—*Mr. A. Wright:* An electrical device for evaluating algebraical formulæ and equations. The device consists in the combination of special rheostats attached to slide rules and a Wheatstone bridge, by which quantities can be multiplied, divided, added, or subtracted simultaneously, and by which complicated algebraical expressions or equations can be evaluated or solved with an accuracy comparable with that attainable by ordinary slide rules.

Mr. C. E. S. Phillips: The flow of sand through tubes. The rate at which the free surface of a column of sand descends in a vertical tube, owing to the escape of powder from an orifice at the lower end, is independent of the head of sand above the opening.—*Mr. A. Mallock, F.R.S.:* Engine worked by stretched india-rubber. The model illustrates a method whereby a long stretched india-rubber cord can be made to produce mechanical work (see p. 358).—*The Daimler Company, Coventry:* A 38-horse-power Daimler engine. A sectional "valveless" engine, bore 124 mm., stroke 130 mm., showing action of piston, sliding sleeves, and other working parts.

Mr. S. Cowper Coles: (1) Specimens of metallic parabolic reflectors, made by electro-deposition, and specimens of electro-deposited metals showing their crystalline structure; (2) working model of an apparatus for uniting aluminium by means of the formation of a flexible skin of oxide.—*Messrs. Strange and Graham, Ltd.:* A process of making ribbon metals. The molten metal is caused to flow through one or more nozzles in a thin stream upon the periphery of a rapidly rotating water-cooled drum. The metal solidifies immediately, and is thrown off from the surface of the drum in the form of a continuous and uniform ribbon. It is possible to obtain metal as thin as 1/1000 inch, and half a mile to a mile of ribbon can readily be obtained from each nozzle per minute. Ribbons of aluminium, lead, zinc, tin, copper, silver, gold, &c., were shown.—*Mr. C. E. Larard:* Cylindrical specimens twisted to destruction. These specimens (principally of mild steel and a 3 per cent. nickel steel) were before testing divided into unit distances by circular divisions, and in addition six generating lines were painted and scribed at equal distances along the surfaces. The final configuration of the cylindrical surfaces after fracture, as revealed by these division lines, shows clearly the surface flow of the material during the plastic stage of the test.—*Sir Robert Hadfield, F.R.S., and Messrs. Hadfield, Ltd.:* Elements and alloys used in steel manufacture; high-speed tool steel, caps for projectiles, &c.

Prof. Threlfall, F.R.S.: Curves, showing that the spontaneous combustion of cargoes of coal loaded in English, Scotch, and Welsh ports practically occurs only with summer loadings. It was shown by the New South Wales Royal Commission on the Spontaneous Combustion of Coal Cargoes (1897) that ships the cargoes of which took fire had mostly been loaded in summer. In view of the high summer temperature of Newcastle, New South Wales, this was only what might have been expected, but it does not seem to have been noticed that a similar relation might obtain for cargoes loaded in the temperate climate of the United Kingdom. An analysis of 4898 long voyage shipments in the years 1873, 1874, and 1875—presented to the English Royal Commission of 1876—shows unmistakably that it is only cargoes loaded in summer which are liable to spontaneous combustion.—*Prof. H. B. Dixon, F.R.S.:* Photographs showing the generation and nature of "explosion-waves" in gases. The photographs were taken on films moving with a uniform downward velocity (between 50 metres and 80 metres per second). The explosions, started by electric sparks, travelled along horizontal glass tubes. The photographs obtained are thus compounded of the horizontal movements of the flame and the vertical movement of the film. This analysis reveals (i.) the slow initial movements of the flame; (ii.) the sudden setting up of the "explosion-wave"; and (iii.) the remarkable effects of "reflected waves." Explosive gas mixtures were also fired by rapid compression with a steel piston. The photographs show that the gases are fired at a point, and are not fired instantaneously throughout.—*Dr. F. D. Chattaway, F.R.S.:* Ammonium perhalides. Although derivatives of ammonia in which hydrogen attached to trivalent nitrogen is replaced by halogen, such as nitrogen chloride, NCl_3, and nitrogen iodide, $NI_3{=}NH_3$, are violently explosive, the ammonium perhalides, which contain complexes of three halogen atoms attached to pentavalent nitrogen, are perfectly stable. They are highly coloured substances, which crystallise well from water, in which they are very soluble.—*Mr. Francis Fox:* Pitchblende, or radium ore, from Trenwith Mine, Cornwall (St. Ives Consolidated Mines, Cornwall). In 1843 Prof. Henwood, F.R.S., drew up a report on the Trenwith Mine with reference to its unproductiveness as a copper mine. He reported that the mine contained large quantities of pitchblende, at that time considered to be valueless. Records exist describing the position of the pitchblende in the mine, and vigorous steps are now being taken for clearing the mine of water and working it for pitchblende. The richer specimens contain 33 per cent. of uranium oxide (U_3O_8), and from 150 to 200 milligrams of radium per ton of ore.

The Director, Royal Gardens, Kew: (1) Experiments with Cyclamen seedlings. Cyclamen seedlings normally have only one cotyledon; if this be entirely removed the second cotyledon will develop. If only the lamina be cut off a new lamina will bud out from the side of the leaf-stalk near the apex, and on the removal of this second lamina a third can be induced to grow out from its stalk just below the apex. If the lamina be mutilated, and not wholly removed, new growths will also be formed. (2) Flowers of Sebæa (Gentianaceæ) with two stigmas. The flowers of the genus Sebæa (Gentianaceæ) from South Africa have been found to have two stigmatic surfaces on the same style, one above and one below the position of the anthers. The lower stigma has been fertilised after removal of the normal one, and from the seeds thereby formed seedlings have been raised at Kew.—*Prof. J. W. H. Trail, F.R.S.:* Preparations to illustrate the retention of colours, especially of green, in botanical specimens exposed to light. The method employed is described in the *Kew Bulletin*, 1908, No. 2.—*Dr. G. H. Rodman:* A series of photomicrographic transparencies of pollen cells.—*Mr. C. E. C. Fischer:* A parasitic fungus on beech (*Armillaria mucida*, Schrad).—*Mr. W. Fawcett:* Drawings of Jamaica orchids.—*Mr. R. A. Robertson:* Photographs for identification purposes of the transverse surface of timbers.

Marine Biological Association of the United Kingdom: The bottom deposits of the southern part of the North Sea. The charts and sections illustrate the great predominance of fine sand in most parts of the area, and the marked contrast between the broad stretches of sand off the Continental shores and the irregular but coarse ground along the English coast. They also show that the finest materials increase towards the north.—*Mr. W. Bagshaw:* (1) Photomicrograph showing abnormal striation of the diatom, *Navicula lyra*; (2) Frustule of diatom, exhibited under the microscope with 1/12 oil-immersion lens.—*Dr H. Gadow, F.R.S., and Mrs. Gadow:* Rare specimens of natural history from Mexico.—*Mr. L. Doncaster:* Case of *Abraxas grossulariata* (currant moth) illustrating sex-inheritance.—*Dr. E. F. Bashford:* Recent advances in knowledge of cancer (see NATURE, December 31, 1908).—*Lieut.-Colonel W. B. Leishman:* The transmission of tick fever. This relapsing fever of man, widespread in Africa, is due to the *Spirochaeta duttoni*, which is inoculated by the bite of a tick, the *Ornithodorus moubata.* Infected ticks may transmit the virus through the eggs to the second and even to the third generations, which, in their turn, may infect man by their bites. The mechanism of this hereditary transmission is not certain, but it appears possible that spirochætes ingested by a tick undergo a change of form, and, in this altered form, penetrate the young ova and infect the next generation, developing anew into spirochæte form under certain conditions of temperature.—*Dr. A. F. Bilderbeck Gomess: Cheyletus eruditus* as an entozoon in man.—*Dr. A. D. Waller, F.R.S.:* Demonstration of the electrical variations of the human heart and of the dog's heart on Einthoven's string galvanometer.—*Mr. S. G. Shattock:* A microscopic section of the aorta of King Menephtah, traditionally regarded as the Pharaoh of the Exodus, showing senile calcification. The mummy was found in 1898 by M. Loret in the tomb of Amenhotep II., at Biban el Muluk, Thebes. It was unwrapped in 1907 by Dr. G. Elliot Smith (acting on the instructions of M. Maspero). The mummy was wrapped in a sheet of fine linen, on which the name was written in hieratic characters. The microscopic sections show the presence of calcareous particles in the middle coat of the artery, such as are met with in senile degeneration.

Mr. H. R. Knipe: Drawings of extinct animals, by Miss Alice B. Woodward.—*Dr. A. Smith Woodward, F.R.S.:* Ramus of mandible and teeth of a herbivorous dinosaur, Trachodon, from the Upper Cretaceous of Wyoming, U.S.A.—*Dr. H. Gadow, F.R.S., and Mrs. Gadow:* Ethnological specimens from Mexico. (1) Prehistoric implements from the States of Chihuahua and Michoacan; (2) throwing sticks, used by the Tarasco Indians of Lake Patzcuaro.—*Dr. C. G. Seligmann:* Photographs of the Veddas of Ceylon and of their ceremonial dances. The Veddas are now limited to the sparsely settled country between the central hill *massif* and the eastern coast. A few still subsist on game, yams, and honey, and live in rock shelters, but the majority build huts and practise a little rude cultivation. Their ceremonial dances are essentially religious, and are performed to obtain the assistance of the spirits of their dead, who are called the Nae Yaku, or of certain long dead Vedda heroes, of whom the most important is the great hunter, Kande Yaka, who is also Lord of the Dead.—*Prof. Karl Pearson, F.R.S., Mr. E. Nettleship, and Mr. C. H. Usher:* Illustrative plates to a forthcoming monograph on albinism (Drapers' Company research memoirs).—*University of London, Francis Galton Laboratory for National Eugenics:* Pedigree work in man. —*Sir Benjamin Stone, M.P.:* Photographic studies of Constantinople and neighbourhood.

NOTES.

THE annual visitation of the Royal Observatory, Greenwich, will be held on Saturday, June 5.

PROFS. YVES DELAGE and M. G. Retzius have been elected foreign members of the Linnean Society.

THE Bessemer medal of the Iron and Steel Institute was presented to M. A. Pourcel at the meeting of the institute last week.

THE Wolcott Gibbs memorial lecture of the Chemical Society will be delivered by Prof. F. W. Clarke at the meeting of the society on Thursday, June 3.

THE annual conversazione of the Royal Society of Arts this year will be held at the Natural History Museum, South Kensington, on Tuesday, June 29.

A *Times* correspondent at Winnipeg reports that an earthquake shock, lasting from thirty seconds to a minute, was felt there and for 500 miles to the west at 10.17 p.m. on May 16.

THE Royal Scottish Geographical Society has decided to award the Livingstone gold medal of the society for the current year to Lieut. Shackleton, for his work in the Antarctic.

DR. G. A. GIBSON, 3 Drumsheugh Gardens, Edinburgh, who has undertaken to edit the medical and scientific papers and articles of the late Sir William Tennant Gairdner, and to preface the collection with a biography, will be glad to know of any letters or other literary remains possessed by friends of the late professor.